DOCUMENT RESUME

ED 024 439 PS 001 158

By- Freedman, D. G.

Personality Development in Infancy: A Biological Approach.

Early Education Research Center, Chicago, Ill.
Spons Agency- Illinois State Dept. of Mental Health.
Pub Date [67]
Note- 46p.
Available from- Holt, Rinehard & Winston, Inc., 383 Madison Ave., N.Y., N.Y. 10017 in Washburn, S. L., ed. "Perspectives in Human Evolution" (pap. $3.95).
EDRS Price MF-$0.25 HC-$2.40
Descriptors- Biological Influences, Cultural Factors, *Developmental Psychology, Environmental Influences, *Evolution, Heredity, Individual Differences, *Infancy, *Personality Development, Personality Theories, Sex Differences, *Theories

This comprehensive paper proposing the use of evolutionary theory as a basis for studies in developmental psychology includes these specific sections: (1) Developmental Theories--a brief overview, (2) Individual Differences, (3) Culture and Inbreeding, (4) Sexual Dimorphism, (5) Critical Periods in the Development of Attachments, (6) Continuity vs. Non-continuity in Personality, and (7) An Evolutionary View of Early Attachments. An extensive seven-page bibliography is included. (MS)

U. S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

With compliments of D. G. Freedman

ED 024439

Personality Development in Infancy; a Biological Approach (D.G. Freedman)

TABLE OF CONTENTS

	Page
Introduction.	1
Section 1. Developmental Theories -- a brief overview.	2
Section 2. Individual Differences.	4
Section 3. Culture and Inbreeding.	10
Section 4. Sexual Dimorphism.	13
Section 5. Critical Periods in the Development of Attachments. .	17
Section 6. Continuity vs. Non-continuity in Personality.	22
Section 7. An Evolutionary View of Early Attachments.	27
Bibliography.	

PS001158

Personality Development in Infancy; a Biological Approach*

D. G. Freedman
Committee on Human Development
and Department of Biology (the College)
The University of Chicago

* * * *

Modern personality theory with its emphasis on individual differences in interpersonal relations stems almost entirely from the developmental system devised by Freud. Using a metaphorical biology, Freud created a system which grew in internal complexity but remained independent of the changing scientific scene in genetics and evolutionary systematics. While at first glance there now seem to be no visible bridges between psychoanalytic theory and modern biology, the general theory of evolution provides so wide an apron as to readily enfold the facts of an interpersonal psychology. Not only that, but since modern biological thinking acknowledges the equally great importance of environment and genotype in the basic formula "phenotype = genotype x environment," and since genotype implies phylogeny, it provides a basis for a wider range of thought than any existing psychological theory.

The field of personality will be viewed here as concerned primarily with the development of human attachments, but certainly not exclusively so, and cognitive development will be largely neglected in favor of an emphasis on affective behavior.

---

*To appear in Y. Brackbill (Ed.) Infancy and Childhood, Free Press, New York, 1967. Writing of this chapter was made possible, in part, by State of Illinois Department of Mental Health Grant #17-233. Thanks are due Professor Bernice Neugarten for the critical reading of an earlier draft.

The present revised version is to appear in Washburn, S. L. (Ed.) Perspectives in Human Evolution, I. New York: Holt, Rinehart & Winston, 1968.

Social attachment will be considered an adaptive, evolved characteristic of many species, and the formation of human mutuality is seen as attained via many evolved mechanisms which are mutually reinforcing and which assure social interaction (see last Section).

For the present thesis, then, personality is defined as a gestalt array of species traits, usually related to interpersonal behavior, which varies uniquely for each individual because the genotype is unique, the individual experience is unique, and the interaction between genotype and experience is unique. The fresh aspect of this definition is that it brings the species concept to the fore and thereby provides a structure in which all hominids may be compared on the basis of their unique variation on the basic hominid theme.

This emphasis on evolved behavior is not meant to deny that familial and cultural institutions do indeed differentially influence behavior and personality. We will, rather, emphasize that such institutions only support or shape man's behavior and do not create it, as it were, out of the blue.

1. Developmental Theories - a brief overview

In considering current psychological theories concerned with development of personality, psychoanalysis contains the only systematic treatment of how relationships develop between humans. Among the other developmental theories, Piaget's cognitive theory has essentially an epistemological goal; one may read Piaget's brilliant observations of mental development in his own children (e.g., Piaget, 1952) without the realization, a) that these children have unique personalities, or b) that Piaget or anyone else was emotionally involved with them. Not unexpectedly, Piaget's attempts to deal with affective aspects of behavior from his cognitive point of view, such as guilt, have resulted in a rather pallid treatment of the subject (Waddington, 1960).

Gesell, too, had only passing interests in the development of affective

attachments, and his main concern was the maturation of perception and motor behavior, an area in which his work is incomparable. For their part, learning theorists have interested themselves in the mechanisms of how knowledge is acquired, and the development of attachments has been a second order concern forced onto the field by the high interest in psychoanalysis. As a point of fact, there has been a more marked influence of learning theory on psychoanalysis than vice versa, and the notion of "stamping-in" via reinforcement has taken over psychoanalytic developmental theory (Anna Freud, 1963).

Within psychoanalysis there are problems at various levels. Bowlby (1958) has observed that "psychoanalysts are at one in recognizing the child's first object relations as the foundation stone of his personality, yet there is no agreement on the nature and dynamics of this relationship." Infancy, for example, has been a convenient period to which some psychoanalysts have attributed various complex experiences supposedly causal to later behavior. Such mistakes were largely due to ignorance about infants, and from Klein (1957) and Sullivan (1965), to name but two, one gets the impression that these fathomless little creatures have a capacity for registering nuance of experience that no human beyond infancy shares. It has also become a matter of professionalism to defend the oral, anal, phallic trichotomy (e.g., Shur, 1960; Spitz, 1960) in the face of overwhelming evidence that babies and children simply do not learn to relate via erotic zones (Orlansky, 1949; Bowlby, 1958).[1]

Despite the resistance to radical revisions, emphasis on libido theory has

---

[1]When faced with objective evidence that, for example, anal training and the anal triad of traits (parsimony, obstinacy, orderliness) are not significantly related (Orlansky, 1949), psychoanalysts counter that the outcome of anal training depends on the child's subjective experience. If this logic is carried far enough it can be seen as an argument for genotypic differences; however, most analysts do not carry their thinking this far, despite the fact that Freud (1918) did.

become muted within psychoanalysis, and two major developmental psychoanalysts, Erikson and Spitz, have managed only clumsily to retain libido theory in their work (Erikson, 1950; Spitz, 1965). Conversely, although in the same vein, the notion of "mastery" now has a place in the mainstream of psychoanalysis, but its relation to libido theory is complex if not confusing (e.g., Hartmann, 1950).

It will become apparent that the present author considers these problems as soluble, but only with substantial revision in theoretical outlook. The direction of change has been heralded in Bowlby's 1958 article, "The nature of the child's tie to his mother," in which an ethological (evolutionary) view of the formation of attachments was proposed. It is considered here that revivification of psychological developmental theory can best be accomplished within a broader evolutionary framework than that proposed by Bowlby, and much of what follows is written with that end in mind.

2. Individual Differences

We acknowledge today two major sources of individual differences in personality--biological structure and familial-cultural milieu. The emphasis in the social sciences has been overwhelmingly on the environmental sources of variance; cultural anthropology and neo-Freudianism have joined in demonstrating to the world that people are differentially shaped by different total milieu.

This may be termed the "modern" view to distinguish it from older views, which were definitely slanted in a biological direction. Hippocrates, for example, wrote of what today would be called biochemical or hormonal predispositions to temperament: predominance of blood, black bile, yellow bile, or phlegm yielded, respectively, sanguine, melancholic, choleric, and phlegmatic temperaments (Allport, 1937).

Many forms of typology have since been proposed, culminating in the recent systems of Jung (extroversion-introversion), Kretschmer (cyclothymic-schizothymic),

and Sheldon (endomorphy-mesomorphy-ectomorphy). Each of these typologies is "dynamic" in that there is an apposition of opposing behavioral tendencies so that they generate a spectrum of possible combinations. It is perhaps because of the simplicity of these dynamic systems that they have been more influential than the complex factoring approaches, from Franz Joseph Gall's in 1835 to those of Spearman and R. Cattell, or the complex taxonomic systems from Fourier in 1851 to Murray (MacKinnon, 1944).

Summarizing the typological approach MacKinnon writes: "All typologies are based upon the assumption that personality is characterized by a more or less enduring structure. Typologists may disagree as to the nature of this underlaying structure; some conceive of it in psychological terms, others conceptualize it physiologically, and yet others think of it in terms of neural structure. It is not by chance that most typologists have been biologically oriented. Typologists may emphasize different traits and characteristics as most fundamentally differentiating the basic types of personality but on one point they agree, namely, that there are intrinsic traits of personality" (1944, pp. 24-25).

Psychoanalysis has also produced a typology, but it is unique in that it simultaneously divides mental structure into dynamically related layers or segments[1] and, at the same time offers a theory of how character types develop. Psychoanalysis, in fact, appears to be the first truly developmental psychological system.

In the early days of psychoanalysis, when libido theory was predominant, libidinal fixations about the mouth, anus, phallus (or clitoris) were considered the basic ingredients of a typology, and libidinal fixation at any stage theoretically gave the developing human characterological uniqueness in his subsequent

---

[1] The topological system, conscious vs. unconscious, or the structural system involving the dynamic balance of ego, id, and superego (Fenichel, 1945).

PS 001158

relationships; but oral, anal, phallic, and genital characters are spoken of with decreasing frequency, even as shorthand descriptions, since their usefulness has been in serious question for many years (Orlansky, 1949). Similarly, in the early days of cultural anthropology, the influence of the psychoanalytic typology led to descriptions of oral, anal, and phallic cultures (Gorer, 1941). Although the tendency lingers on, Mead, for example, long a devotee of psychoanalytic characterology (e.g., Mead, 1949), has changed her thinking in the direction of "ego psychology" (Mead, 1955).

Psychoanalysis is clearly in flux and, as a matter of fact, needs help to direct it into more viable ways.

What's wrong with typologies? "The philosophical basis in much of early science was typological, going back to the eidos of Plato. This implies that the 'typical' aspects of the phenomenon can be described, and that all variation is due to imperfect replicas of the type, all variants being, in the terms of Plato's allegory, 'shadows on a cave wall.' Such typological thinking is still prevalent in most branches of physics and chemistry and to a considerable extent in functional biology, where the emphasis is on the performance of a single individual. The typological concept has been completely displaced in evolutionary biology by the population concept. The basis of this concept is the fact that in sexually reproducing species no two individuals are genetically alike, and that every population is therefore to be characterized only by statistical parameters such as means, variances, and frequencies. . .Genetic variability is universal, a fact which is significant not only for the student of morphology but also for the student of behavior. It is not only wrong to speak of the monkey but even of the rhesus monkey. The variability

> of behavior is evident in the study not only of such a genetically plastic species as man but even of forms with very rigid, stereotyped behaviors such as the hunting wasps. . .The time has come to stress the existence of genetic differences in behavior, in view of the enormous amount of material the students of various forms of learning have accumulated on nongenetic variation in behavior" (Mayr, 1958, p. 351).

The point is that all diploid populations (those with two sets of chromosomes, one set paternal and one set maternal) show a wide range of genetic variation and that no two genotypes are precisely alike (save in identical multiple births). This gives a population greater viability as well as increasing the possibilities for ultimate speciation. The exceedingly slim chances in man, for example, of the same mother and father producing two identical offspring can be seen from the fact that each may produce 2^{23} kinds of gametes (8,388,608). As if this were not sufficient variation, if one additionally assumed only two percent of the genes were heterozygous, a single cross-over between each pair of strands would raise the figure to 8,388,608 followed by 23 zeros, a very conservative figure at that (Stern, 1960).

It is not surprising, then, that the search for a stable typology of personality, if indeed personality has biological roots, is a doomed project before it starts. Let us consider, for example, the genetics which most probably underlay correlations between body build and personality such as those found by Sheldon (1942). This is best illustrated by animal experimentation where the proper matings and controls are possible, but as far as we know the logic holds for all living forms.

Stockard (1931), in his work with temperament and behavior in dog breeds, was able to genetically dissociate behavioral traits from body build by crossing

experiments, and dissociation always occurred in the F_2 and back-cross generations as one would expect from Mendelian models. For example, he was able to take the lethargic and low-slung Basset hound and, via the proper matings, produce Basset-like dogs with high strung behavioral characteristics. It can therefore be deduced that the lethargic low-slung Basset hound was simultaneously bred for lethargy and body build since the two are genetically independent.

In all probability there is an analogous history to the correlations found between human temperament and body build. In the history of human groups there may well have been selective packaging of genes so that today certain body builds go with certain temperaments more often than by chance; but we must assume that such correlations can be broken, and that all combinations of temperament and body build are possible. Sheldon's own data bear this out, in fact, in that he finds no pure "types." In light of modern biological thinking, then, it is safest to assume the potential for continuous variation of behavior rather than a "natural" piling-up into discontinuous categories or types.

The relationship between human personality and genetic variability is clearly illustrated by the following two studies comparing identical and fraternal twins. In the first investigation, a group of twins was studied on a weekly basis over their first four months of life and in the second, a group was studied on a monthly basis over the first year (Freedman, 1965; Freedman & Keller, 1963). Usually, twin studies are open to the criticism that mutual imitation or special parental treatment has caused the greater concordance in identicals, but these criticisms were effectively ruled out in these studies. Parents were unaware of zygosity and their treatment of the twins was carefully watched and assessed; also, since mutual imitation does not start until after one year of age, it could be ruled out as affecting behavior in the first year.

In the group seen weekly through four months, the focus was on the

development of social attachments, with specific emphasis on eyes-closed smiling (first month and after), the time at which the infant's eyes start to fix on the adult face, the subsequent onset of social smiling and its frequency and ease of elicitation, the intensity and extent of cooing, and the timing and ease of eliciting laughter. It was found that fraternal pairs were substantially different on these measures and that identical pairs were substantially alike Identicals often differed in the onset of these behaviors (so that what A was doing one week, B was doing the next), but the overall patterns were far more alike than in the fraternals, where both timing and patterning were substantially unlike.

The same general findings characterized the second study as well. In a particularly well-controlled aspect, monthly motion pictures were taken over the first year in which each twin of a pair was filmed separately in the same situations. At the end of the study the films of one twin were rated on a behavior scale by a group of four professionals who had worked with infants, and the films of the other were rated by a second comparable group. In this way a possible "halo" effect was avoided, and again intrapair differences among fraternal twins were significantly larger. Two of the items which proved significantly more concordant in identicals were intensity of social orientation and degree of fear of strangers, both of them items which would be admitted to any list of personality traits.

Given these results, there seems no reasonable alternate to the explanation that heredity plays a role in the development of the social behaviors investigated. It also follows that the behavioral phenotypes will vary from generation to generation as the genes follow general Mendelian laws, no matter if the behavior is monogenetically or polygenetically instituted; for it is not at all likely that pertinent environmental conditions will co-vary so as to continuously

compensate for genetic rearrangements.[1] Inasmuch as biological determinism is often incorrectly equated with fixity, it is worth stressing that the tie between personality and genetics is evidence for the continuous variation of personality and evidence against typological systems.[2]

3. Culture and Inbreeding

Cultural anthropology has changed popular thought as few sciences have done in the past. We know, as did no earlier age, that the typicality shown by various nations and tribes is due largely to a lifetime of learning and social interaction within given milieus. One can see on film the Balinese boy, Karba, growing from a universal infancy into a withholding, muted, graceful, suspicious child, typical of the Balinese (Bateson and Mead, 1942).

But was it a universal infancy? This is a reference to the very real possibility that the Balinese gene pool is unique in the world as a result of its specialized genetical history, and that Balinese are somewhat differently constituted than, say, a similarly isolated New Guinean tribe. This somewhat touchy subject has received little attention in the past due to the spectre of racism but, hopefully, that period is passing.

Let us first consider the genetics of the situation. In the evolutionary sense all people are related since at some remote stage in their history they had common ancestors, and the Adam and Eve story is allegorically correct.

---

[1]As noted in the introduction, a phenotype is always the result of a complex interaction between genotype and environment. Studies of twins reared apart, such as that of Newman, Freeman, and Holzinger (1937), have been somewhat misleading in this respect. When separate rearing leads to different performance in identicals, as was found in this study, the explanation is that G x E interaction has been different, and it is of course not proof that the behavior in question is independent of heredity. See Section 6 for further discussion of this point.

[2]Science has been described as the making of discontinuities from continuities and continuities from discontinuities. At this stage in personality theory it seems advantageous to promulgate the latter.

Thus Harrison (1964) writes: "So far as some particular population is concerned, its past size, if all individuals were unrelated, would have to have been far greater than it actually could have been, since every individual has two parents, four grandparents, eight great-grandparents, and 2^n ancestors n generations ago. Assuming that on average there have been four generations per hundred years, an individual would have 2^{40} or approximately a million million ancestors a thousand years ago, if there had been no consanguinity. It seems probable that the total population of the world in the tenth century did not exceed 200 million and it was very much smaller in yet earlier times!" (pp.158)

This reasoning which renders all men relatives also makes it clear that in the history of any closed cultural group there has been considerable inbreeding. This, together with the "founder" principle, i.e., the dependency of the gene pool on the founding generation, leads to the irrefutable conclusion that the gene pool is to some extent unique for each such population. In light of our previous discussion, it should be clear that this may as readily produce distinct behavioral phenotypes significant for personality as it does significant physical variations. In addition, there is the fact that different cultures may emphasize different mating tracks so that, as in the development of domestic breeds, unique cultural selective processes may lead to uniquely organized genotypes (Ginsburg and Laughlin, 1966).

There are few data in this area, but it is now well known that African babies in several sections of Africa are born with greater skeletal maturity and more developed motor abilities than comparable groups of European infants (Geber, 1956). They retain this relative precocity until the third year, when the tests become highly verbal, and when gross motor items are no longer used (e.g., how well a child plays ball, leaps, jumps rope, etc.). The Caucasian children subsequently do better with verbal abstractions. The same pattern is seen in

Negro-White comparisons in the United States (Bayley, 1965; Lesser, et al., 1965). The usual interpretation of the switchover at age three is that there is less chance for Negro children to apply verbal abstraction in their milieus (e.g., Geber, 1956). On the other hand, there is little choice but to acknowledge the genetic aspects of the racial differences found in the first years.

There is no other carefully controlled work along these lines, but there are many possibilities. In Hawaii, for example, clearcut differences have been observed between Japanese and Polynesian babies in their reactions to the first inoculations at three months. Polynesian babies rarely cry and, if they do, they recover quickly. Japanese babies usually have an intense reaction, remain fearful for a considerable period, and in some cases continue to cry on subsequent visits to the doctor (Marshall, 1965). While this reaction may be indirectly due to differential tension between the mothers, it would be possible to study such group variations with the proper controls.[1]

To my knowledge no ethnologists are currently working with gene-pool hypotheses, although ideas which flow from population genetics hold far more promise for extending our knowledge of man than the worn hypotheses concerned with libidinal fixations.

As a final word on this point, it should be emphasized that all humans share basic traits and that there is continuous variation within all groups that gives them considerable overlap with all other human groups (Dobzhansky, 1964). We have chosen to emphasize potential genetic factors which make relatively inbred groups unique because this is once again a fresh approach.

---

[1] In a recent factor-analytic study of personality in twins, Loehlin (1965) found that the same factors which had a high hereditary loading also had a high environmental loading. There is the clear implication in these data that cultural institutions have developed in support of man's biological nature.

4. Sexual Dimorphism

Boy-girl differences are reported from time to time on many different behavioral continua (Ausubel, 1958; Mussen, 1963), and for the most part these differences are explained in terms of cultural and familial influences. Bandura and Walters (1963), for example, explain the repeated findings that boys are more aggressive than girls as follows: "This finding is not surprising for children brought up in a society in which aggression is much more tolerated in boys and in which the socially approved physically aggressive models, e.g., sports and film idols, are males" (p. 378).

It is a frequent finding that females are more passive and dependent than comparable groups of males (Ausubel, 1957). Kagan and Moss (1960), on finding that females are more consistently passive and dependent than males from birth through adolescence, interpret their data as follows: "It was suggested that environmental disapproval and punishment of dependent behavior in young males led to inhibition of and conflict over dependency in the growing boy. The social acceptance of passive and dependent behavior in females would be expected to result in greater stability for this class of responses for women than for men" (p.446).

Ausubel writes of children between eighteen and forty-two months as follows: "Girls apparently manifest less negativism at this age than do boys for two reasons: first, because they see themselves as more accepted and intrinsically valued by parents and have a more available like-sexed person with whom to identify, they can acquire more derived status. Second, they are able to obtain more subsidiary primary status than boys can by participating in female household tasks" (Ausubel, 1958, p. 293).

Margaret Mead noted that a difference between boys and girls which holds in all cultures is the greater investigativeness and intrusiveness of boys as evidenced, for example, in their tendency to wander farther from home. At the time

(1949), she gave this finding a psychoanalytic interpretation, relating such behavior to the acquisition of the "phallic mode." It was not clear, however, whether Mead viewed the phallic mode as universally learned or as primarily the result of maturation.

To summarize these examples, young males were found to be more negativistic, more aggressive, more investigative, and less passive and dependent than females, and in each case, with the possible exception of Mead, it was assumed that social pressures caused these sexual differences.[1] Interestingly enough, these very traits typify male-female differences among many primate species and we must suppose, following the above, that human culture or, in the case of Mead, human libidinal development has patterned itself on biological differences at the subhuman level. Once again, an evolutionary perspective will help us evaluate these data.

First, what is the function of sex? The evolutionary answer is that it provides a population with tremendous variability unobtainable in asexual reproduction (see Section 2), and such variability usually makes possible the continuing survival of at least some members of this population under conditions which are lethal to most.

Once introduced into the course of evolution, sexual differences themselves became exploited, so to speak, via secondary sex characteristics. Etkin's discussion of differences in aggressive potential is to the point:

> "A secondary sex characteristic, which may be designated as aggressive potential, is the difference between male and female with regard to capacity for fighting. This type is common among

---

[1] In a subsequent publication Kagan and Moss (1962) discuss the possible constitutional bases for the boy-girl differences found in their studies. It is slowly becoming clear to many workers that "social role" and "constitutional type" are facets of the same self-actualizing process, i.e., the cultural and the biological are in fact inseparable.

vertebrates. Most prominent among these dimorphisms are differences in size and strength. One of the extreme examples is seen in the seals and related marine carnivores. Elephant-seal males are as much as two and a half, and fur-seal males ten times as large as their females. Though this is extreme, a difference of 50 per cent or so is not at all rare among mammals. In a majority of mammals, the male tends to be bigger and heavier than the female. Only exceptionally, as in the European rabbit, is the female the larger.

"Aggressive potential in favor of the male often takes the form of weapons. Horns and antlers are in many instances differentiated between sexes. We are familiar with them in many species of deer. Teeth as weapons are also frequent secondary sex characteristics of mammalian males. We see this in the enlarged canine teeth in male baboons and, in extreme form, in the single large tooth of the narwal. In birds, examples of dimorphism in weapons are fewer, but the spurs of the rooster provide a good one." (Etkin, 1963, p.110).

There are many other considerations in sexual dimorphism, such as the display coloration in males of many species usually associated with territorial defense and mating. Less dimorphic animals tend to share more tasks, including nest-building, care of young, hunting, etc.

While it has long been recognized that there are male forming and female forming hormones in vertebrate embryos (Willier, et al., 1955), we are only now learning something about the behavioral correlates of embryonic hormonal activity. Young and co-workers (1965), for example, injected pregnant rhesus monkeys with testosterone propionate, and thereby made male pseudo-hermaphrodites of the female fetuses, i.e., at birth these were virilized genetically female monkeys.

Tests of early development revealed typical male rhesus behavior with regard to social encounters; facial threats, invitations to play, and rough and tumble play were distinctly male-like. Similar injections after birth did not have comparable effects, although in rats analogous behavioral effects occurred with testosterone injections up through five days after birth. In both these studies it appeared that testosterone propionate affected the developing central nervous system in some complex way to produce the male phenotype, and recent evidence with human male pseudo-hermaphrodites indicates that human sexual differentiation occurs in the same way (Landau, 1966).

Despite these data, there has been in recent years considerable propaganda claiming sexual neutrality in humans at birth, largely due to publications by Money and Hampson on sexual reassignment of constitutionally anomalous individuals; the clear implication has been that in humans the sexual role is predominantly a learned affair. This extreme position has become somewhat more balanced (e.g., Money, 1965), and a recent critique of the Money and Hampson view by Diamond (1965) makes a good case for returning to a more classical biological view of sexuality--not very surprising in light of the foregoing.

With regard to the "Oedipus complex," it seems likely that the upsurge of rivalrous feelings which human four- and five-year-olds experience is due primarily to hormonal shifts acting on the central nervous system. Male-male competition in particular seems predicated upon the evolution of dominance rivalry so widely seen among group-living species, and hominid infantilization seems to account for the precocious appearance of this need to win and to be "top dog." Little experimental work has been done to date in tracing the longitudinal course of androgen-estrogen balance, but it is clear that we can no longer persist in the notion that behavioral consequences of hormonal differentiation of the sexes occurs for the first time at puberty (e.g., Ausubel, 1958).

In summary, there can be little doubt that human dimorphism follows the general mammalian trend and that it shares similar functions. Thus when we find little boys less passive, more negativistic, more aggressive, more rivalrous, or more investigative than little girls, we probably have our mammalian-primate ancestry to thank and not some proposed libidinal stage nor some makeshift social force. This is not to deny, of course, that cultural institutions do indeed support and differentially shape such biological trends.

An evolutionary analysis[1] of human dimorphism has never been seriously

---

[1] What we mean by evolutionary analysis will be discussed further in Section 7. To give a brief example--it is of substantial evolutionary interest that human females mature more quickly than males in such diverse areas as bone

after their mothers left when the infants were three months of age. "The infants remained in the Foundling Home, where they were adequately cared for in every bodily respect. Food, hygiene, medical care and medication, etc. were as good as, or even superior to, that of any other institutions we have observed."

At the end of the second year these children had either died (ca 40%) or else had developmental quotients at the level of severe defectives. This information was first published in 1945, and as of his most recent publication Spitz (1965) still insists this wasting away, called marasmus, was due entirely to lack of "mothering." The fact is that the "Foundling Home" was located in a severe protein deficiency belt and that marasmus was and is a major public health problem there, even among home-reared babies (Scrimshaw & Behar, 1961); it is therefore small wonder that no temperate zone worker has ever found such lethal results from lack of mothering.

Facts such as these as well as Spitz's poor reporting (Pinneau, 1955) have cast doubt on the entire notion of the first year as a critical period in the formation of attachments, but there is nevertheless ample evidence that Spitz's pioneering work was in the right direction. Bowlby's famous monograph of 1952, Maternal Care and Mental Health, has withstood the test of criticism and time and in a recent re-evaluation Ainsworth (1962) gave the following excellent summary of the results of affective deprivation: (pp. 153-154)

> "(1) Recovery from a single, brief, depriving separation experience seems fairly prompt and complete with respect to overt behaviour under ordinary conditions; there is evidence, however, of vulnerability to future threats of separation--i.e., there is at least one "hidden" impairment that prevents the reversibility from being described as complete.
>
> "(2) Relief from deprivation after even fairly prolonged deprivation

experiences in early infancy can result in rapid and dramatic improvement in overt behaviour and in generalized intellectual functioning; vocalization, however, may be retarded, even though the relief occurs before twelve months of age, and effects on other specific aspects of intellectual and personality functioning cannot be ruled out until these aspects have been explored in research.

"(3) Prolonged and severe deprivation beginning early in the first year of life and continuing for as long as three years usually leads to severely adverse effects on both intellectual and personality functioning that do resist reversal.

"(4) Prolonged and severe deprivation beginning in the second year of life leads to some grave effects on personality that do resist reversal, although the effects on general intelligence seem to be fairly completely reversible; specific impairment of intellectual functions has not yet been studied.

"(5) The effects of age at the onset and relief of the deprivation experience are undoubtedly important factors in influencing reversibility, but these are not understood in enough detail to set precise limits for a "sensitive phase" of development of special processes.

"(6) In general, in the first year of life, the younger the infant when deprivation is relieved (and hence the less prolonged the deprivation experience), the more normal is the subsequent development; yet after the first year of life has passed, the older the child at the onset of deprivation the more readily and completely reversible seem to be the effects of a deprivation of a given duration.

"(7) Certain impairments seem to be less readily and less completely reversible than others--impairments in language, in abstraction and in the capacity for strong and lasting interpersonal attachments.

"(8) Especially if undertaken when the child is still very young, intensive therapeutic efforts may result in marked improvement of some very severe effects that resist reversal through ordinary relief from deprivation.

"(9) Subsequent experiences of insufficiency, distortion or discontinuity in interpersonal interaction may be important in reinforcing impairments that otherwise might have been reversed more or less completely."

While these findings are remarkably straightforward,[1] it is difficult to pinpoint the rising fear of strangers in infants (see sec. 7 and Loring, this volume) as a natural end to the period in which primary attachments are formed, as Gray (1958) has proposed; but it is also a safe guess, on the basis of the data reviewed by Ainsworth, that for most infants attachments by seven months are essential. In evolutionary terms, it is highly adaptive that attachments between human infant and caretaker form by this age so that subsequent development of autonomy, in the newly motile child, may take place relatively unfettered by recurring dependency.[2] Erikson's (1950) surmise that a basic

---

[1]Casler (1961) has chosen to emphasize the shortcomings of research in this area and, like the man seeking lost keys only where the light is good, suggests perceptual deprivation rather than affective deprivation is the basis for these findings. Actually, no such sharp distinction is possible, for cognition, perception, and affective behavior all work in concert and represent our own somewhat artificial abstractions. In addition, as Ainsworth (1962) points out, in the early months of life perceptual deprivation is equivalent to social deprivation since it is primarily the caretaker who provides the infant with perceptual stimulation.

[2]The evolutionary point, so to speak, is to form the attachment and get on with the next stage. Also, it is apparent that precise decisions about a critical

sense of trust or mistrust is established in the first year is a complementary way of dealing with the same set of events.

Erikson (1950) has further proposed that the major theme of the second and third years is the development of autonomy. Few observers would deny that the demand for and insistence on autonomy forms a major aspect of the lives of two- and three-year olds, nor is there much difficulty in surmising the evolutionary importance of such self-propelling investigation of the environment, at this age.[1]

In considering the relation of developing autonomy to attachments formed in the first year, Harlow's (1959) observations of monkeys who had not received "contact comfort" as infants is to the point. These sensually deprived Rhesus infants explored very little, preferring to lie in one spot, and in effect suffered from impaired autonomy. The young orphaned children described and filmed by Appel and Aubry (1951) behaved with striking similarity; they were fearful, they explored very little, and they had to be helped to find out what the world was like. Ainsworth reports other such data and it seems that this is one way in which events of the first year may affect ensuing development. We can assume further that the manner in which years two and three are negotiated affects the relatively unique developments of the four-year-old period, and so on, and logically each period must to some extent be "critical" for the next.

---

period for attachment in humans is not possible in contrast, say, to imprinting in precocial ground-nesting birds. Evolutionally speaking, the latter must be on their feet soon after hatching or they would be open to severe predation. The situation is the same in precocial mammals, such as the wild forms of sheep, goats and cattle, all naturally preyed-upon animals, and attachments are made within hours after birth after which the flight response to strangers develops (Freedman, 1961). In animals not under direct predator pressure, such as man, the time period in which primary attachments occur is always longer and more variable. Additionally we have in man the factor of extensive infantilization, i.e., the prolongation of dependency over the longest period of time of any mammal. Thus attachments have a long time to form and, as we shall see in the last section, there are numerous alternate (or complementary) mechanisms through which this may be accomplished.

[1]That parental thwarting of autonomy will result in shame, as Erikson

As for individual differences in relation to critical periods, experimental work with animals provides a helpful paradigm. Ginsburg (1965) has demonstrated that the handling of some strains of mice during a pre-weaning period will exaggerate adult aggressiveness whereas handling another strain will result in unusually pacific animals. In addition, the amount of handling also makes a difference in later aggression depending on the strain of mice used. Since each strain is essentially a single sample of the species' possibilities, it is clear that tremendous variability exists in responsivity to early stress. Breeds of dogs yield similar information (Freedman, 1958) and there is no reason to suspect the same is not true of humans. Experiences critical for one child may well have entirely different effects in another, and variability rather than uniformity of response is to be expected within the broad framework of the species pattern, providing the experiences or deprivations are not completely antagonistic to the nature of the species. With regard to this last point, Murphy (1964) has pointed out that individual differences are maximal in the relatively healthy, and the extreme deprivation discussed by Ainsworth amounts to a species-wide debilitation where individual differences become submerged by the shocking nature of the general symptomatology.

6. Continuity vs. Non-continuity in Personality

One of the earliest reports in this area is that of Neilon (1948) who contacted in late adolescence the individuals Mary Shirley had studied over their first two years of life (Shirley, 1933). General personality descriptions were made of these young men and women which were in turn blindly matched

---

holds, has much less to recommend it. The feeling of shame is a common Japanese emotion, for example, yet autonomy in boys is greatly encouraged and considered desirable in that culture (Haring, 1956).

to Mary Shirley's descriptions of them as two-year-olds. Matching was well above chance and the conclusion was drawn that there is considerable continuity in personality structure.

On the other hand, the attempt to assess continuities via the preset categories of rating scales or trait checklists has been only minimally successful, and the "meaty" individualized aspects of personality descriptions have invariably been lost. Recent reports by Kagan and Moss (1962) and Bayley and Schaeffer (1962) on separate longitudinal studies of about thirty years' duration are to the point. Bayley and Schaeffer's report found the most stable dimensions over the years were "active, extroverted vs. inactive, introverted" behaviors, while Kagan and Moss found consistency from the preschool years to adulthood in the aggressive behavior of males and in the passivity and dependence of females. The latter finding is borne out by Honzik and Macfarlane (1964) who found greater consistency in females over the years on the independence-dependence dimension, and also by the aforementioned Bayley and Schaeffer study in which relative stability among females in an active-passive dimension was found. While these findings are interesting, particularly from the point of view of evolved sexual dimorphism (Section 3), they are rather sparse representatives of what we usually think of as personality.

Without doubt, a major problem in assessing continuites has been the fact that maturational changes affect the total organism; that is, there is constant reorganization as new nodal points in development are attained (Goldstein, 1939). For example, toddlerhood, adolescence and parenthood necessarily involve considerably different sets of phylogen-

etically evolved adaptations[1]; since the organism's viability depends on its ability to achieve organization in terms of all forces acting on it, whether exogenous or endogenous, there is a continuous repatterning of personality in the service of maintaining "centeredness." (Goldstein, 1939).

For somewhat the same reasons prediction of personality from performance in infancy has also met with minimal success (Fries and Woolf, 1953; Escalona and Heider, 1959; Benjamin, 1959). Since each genotype is highly unique, and since the interaction with the environment further individualizes the organism, we simply do not have a means of predicting specific patterns as they emerge within any given ontogenetic history.

It is not surprising, therefore, that Macfarlane (1964) is more impressed by the changes than by the continuities in the thirty-five years her growth study has been active, and it is her view that the most interesting aspects of personality are those which are essentially not predictable, e.g., how someone may deal with an emergency. This is borne

---

[1]This view of development is illustrated by Lorenz's concept of "kumpan" relationships in birds (Lorenz, 1957). It is based on the observed fact that birds react to the social companion (kumpan) appropriate to their maturational stage, be it an object of nurturance, mating, aggression, etc. Lorenz's pet jackdaw, for example, although lacking his own offspring, reacted nurturantly when confronted by gaping chicks. These ideas will be treated further in the last section.

out by the work of MacKinnon (1948) and his O.S.S. colleagues during the Second World War in which, on the basis of extensive personality assessment, they unsuccessfully tried to predict what people would do in various emergency situations.

Similarly, in the study reported by Murphy (1964) in which over sixty children were studied from infancy through pre-puberty, "over half the children changed markedly in one or another aspect of functioning . . . children showing most continuity had greater developmental balance and less vulnerability in infancy, and were growing up in environments which were relatively homogeneous, stable, free from traumatizing vicissitudes, and congenial to the child's natural style of development." Murphy was impressed with the individual styles of coping which, whether continuous or discontinuous over the years, tend to be unique for each person.

It should be stressed that the uniqueness of personality cannot be taken as evidence for the operation of extra-biological factors, and a few words on free will and self-directed behavior seem in order here. De Chardin (1961) has correctly pointed out that, "The ego only persists by becoming ever more itself, in the measure in which it makes everything itself. So man becomes a person in and through personalization." This activating and self-making ego, however, must work within the constraints of one's genetic and biological parameters, for it is itself a product of evolutionary change. From the present point of view then, free will is seen as an evolved capacity of hominids which, like other evolutionary developments, endows a species member with greater homeostatic possibilities. Indeed all related concepts, such as the sense of self, volition, self-esteem, etc. may be readily dealt with by current

biological thought, and no extra-biological concepts seem warranted.

In our view, then , the major non-artifactual reasons for discontinuities in personality assessments are: 1) the fact that flexibility and conscious directionality of behavior are built-in characteristic of hominids; 2) different stages in ontogeny are characterized by (phylogenetically) evolved behavior adaptive to that stage.

As for illustrations of constitutional x environmental interactions[1] over time, the best examples come from various animal studies with inbred groups. To take but one study, Freedman (1958) reared puppies of four dog breeds in either a very permissive fashion or under a strict regimen of training and found:

(1) Each breed (genotype) reacted to the same mode of rearing in a unique way.

---

[1]Since all conditioned reactions require some unconditioned behavior at the outset, logically speaking, there is no behavior that does not at some level of analysis involve an heredity x environment interaction. Thus, if identical twins are raised in different linguistic environments, to take an extreme example, their speaking different languages is not independent of some genetically based ability to acquire language. However, the question of the extent to which a behavioral trait is inherited vs. the extent to which it is acquired is basically an unsolved problem. This is usually dealt with by calculating a "heritability" score based on within-pair differences of identical vs. same-sexed fraternal twins. Unfortunately, this method is more often than not misleading. For example, high concordance in bleaching of hair has been found in identical pairs and not in fraternal pairs, which gives hair-bleaching a substantial heritability score (Nichols, 1966). The answer to this seeming absurdity must lie in an analysis of what probably went into the finding: Presumably women of certain hair colors bleach with greatest frequency, and it

(2) The breed x environment interactions varied kaleidoscopically, depending on the test or task imposed.

(3) The same behavior in one breed might be due primarily to constitution and in another primarily to conditions of rearing (termed a "phenocopy" by geneticists).

(4) In the follow-up period which lasted over a year, three breeds showed a straight-line continuity in their social reactions to humans modeled on behavior learned during early rearing.

(5) In one breed the permissively reared animals changed markedly over time, whereas the disciplined group continued to show the same fawning behavior developed in puppyhood.

(6) Some breeds were more deeply affected by the early modes of rearing than others.

It should be made clear that this study is presented as an illustration of a few well worked-out genetic x environmental permutations, and in actual fact the number of G x E interactions must have been far more numerous. In addition, if other breeds or other methods of rearing had been used, the interactions would have probably been considerably different. In work with humans, of course, such G x E interactions cannot be dealt with in an accurate or repeatable way, but there is every reason to believe that this study offers a reasonable, general paradigm for analogous interactions which must occur in hominid growth.

7. An Evolutionary View of Early Attachments

In 1958 Bowlby wrote, "Psychoanalysts are at one in recognizing the child's first object relations as the foundation stone of his personality: yet there is no agreement on the nature and dynamics of this relationship."

---

makes sense to assume that the genetic component enters at the level of hair color. More often such an analysis is not possible, and we are simply left with an un-understandable score of heritability.

He then went on to make the first fresh analysis of the nature of the child's emotional tie to the mother since Freud's "Three Contributions to the Theory of Sex" (1918). Bowlby described sucking, clinging, following, crying, smiling, and possibly cooing and babbling as evolved[1] responses (in the Darwinian sense), all in the service of assuring an attachment between infant and adult in their earliest manifestations. Each, to be sure, was seen as serving a variety of other purposes as well and were part of other maturational trends which, transmuted to varying degrees, carry through the life span.

Bowlby's major critique was that "psychoanalytic theory has become fixated on orality," and it was his avowed purpose to "free it (psychoanalysis) for broader development." Unfortunately, psychoanalysts have tended to reject this attempted revision as coming from outside psychoanalysis and in effect have accused Bowlby of playing quite another game (A. Freud, 1960; Shur, 1960; Spitz, 1960).

The following is intended as an extension of Bowlby's insights, and the ways he proposes that a child achieves attachments will be considered in a somewhat extended evolutionary context.

As a first step it will be appropriate to consider the characteristics of modern evolutionary thinking. For one thing, evolutionary thought is often seen as circular. Something is said to have adaptive value for a species and the proof offered for this contention is that the species has survived, e.g., imprinting or the rapid formation of primary attachments is an adaptation of

---

[1]In this paper we are using the term evolved and have avoided the ambiguous dichotomy of innate vs. acquired. Evolution has been termed opportunistic (Simpson, 1964), so that in a species in which learning can become well developed any major genetic innovation in behavior will be completely interdependent with learning. Imprinting, for example, obviously involves both innate and acquired elements. Rather than becoming lost in a make-believe partitioning of these elements, it is preferable to speak of imprinting as "evolved behavior." This latter term has the further advantage over "innate" of having clear phylogenetic reference without any implications regarding neurophysiological processes.

ground-nesting precocial birds to intense predator pressure, and the proof is said to be that these birds have survived predator pressure.

The point is, however, that evolutionary thinking depends on a nexus of relationships in which each datum, although weak by itself, grows in strength when considered in the context of other evidence. Evolutionary theory is primarily oriented towards the understanding of an event with regard to its adaptive function rather than, say, the biochemical process underlying it. The latter form of research is sometimes called the "atomistic approach" (Waddington, 1966), and ideally the two approaches are coupled in mutually supporting theory and discovery.

In this regard, it is assumed that all the genes within an organism act in concert and that, for example, the XX chromosomally constituted female and the XY male are not dimorphic as <u>direct</u> action of the different chromosomes and genes involved; rather the XX or XY takes the entire genome in the direction of maleness or femaleness via complex interactions, which have in turn come about phylogenetically by a series of "mechanistic" processes. In other words, evolution has yielded organization, and it is up to the scientist to discover the mechanisms involved, always having in mind total functioning.

The same holistic logic holds for the analysis of behavior, i.e., any item of behavior takes on meaning only when examined in light of the total species' adaptation (Von Uexkull, 1957). <u>Thus, an item of infant behavior, e.g., the smile or cry, must be considered in terms of total hominid adaptation, including the total life span.</u>

From this point of view, the equation of development with ontogeny is erroneous and can lead to false conclusions; it is no more logical to start with the baby in a description of the life span than with any other stage of life, for species survival and the evolution of adaptations involve all phases of the

life span. This is in distinction to psychological systems which assume a strict causal chain between earlier and later events.

Formation of the Family

Before considering infant behavior a few words about biological aspects of the family system are in order. We know that the infant will generally be born into a family since the family system is universal in man (Malinowski, 1956). Why men and women form families in every culture has never been adequately analyzed, but clearly there have evolved a number of assurances that men and women will mate, and further that they will tend to stay together.

Consider, for example, that the mature human female is the only mammal with breasts which are prominent when not lactating, and it becomes apparent that the upright hominid posture made possible the evolution of the distended breast as a sexual releaser. Needless to say, there are many other aspects of female structure and behavior which attract males, yet what current psychological theory concerns itself with the obvious function of female beauty as an evolved sexual attractant? In the same vein, the ability to fall in love is rarely thought of as an evolved species characteristic but it, too, seems to be another hominid universal; and it characteristically occurs with greatest intensity at the most adaptive time, just after puberty. Continual sexual readiness and receptivity among hominids seems also to bind the partners together via the resulting emotional reinforcement, although we know that fairly permanent pairing may occur in the Anatidae, who have only seasonal sexual activity, via various non-sexual behavior mechanisms (Lorenz, 1966).

Note that this approach is distinct from so-called cultural evolution, i.e., the view that culture provides for the evolution of behavior independently of biological determinants (White, 1949). The major weakness of this latter

view is that it considers culture as something "layered on," instead of a process that responds to and reflects man's evolved nature.

We will now go on to a consideration of the formation of attachments in the baby.

Crying, Holding, and Caretaking

The very first behavior exhibited by the newborn is the cry, a common mammalian occurrence. Detailed analyses of the behavior around human crying are only now being made (Wolfe, 1966) but crying seems to share the common mammalian function of exciting the parent to caretaking activities. In dogs, for example, a puppy removed from the nest immediately starts to cry and continues until exhausted. The bitch will usually become extremely excited, seek the source of the cry until the puppy is found, and then fetch him back. What we have here, clearly, are two complementary evolved mechanisms, and neither has to be learned.[1]

In the human, similarly, it can be demonstrated that within hours after birth most crying infants will quiet when held and carried. Consider how this cessation of crying coordinates beautifully with the intense anxiety felt by the parent until the infant is quieted. Aside from caretaking and feeding, body contact is the inevitable result of crying, and the human baby does as well as the macaque in getting next to the parent without the ability to cling. There seems little doubt that such contact is normally a mutually reinforcing experience, and affectionate or appeasing tactual contacts of one form or another

---

[1]It is a general mammalian and avian characteristic that the very young, when left alone or when lost, yelp, cry, or chirp. When these noises are heard by the parent, various forms of retrieval behavior occur. While such vocalization exposes the young to predation, they would die in any event without parental aid; so that, like many evolutionary mechanisms, a compromise is reached between two opposing possibilities. Few mechanisms do not to some extent compromise the chances of survival, and this occurs with such frequency that compromise can be termed a general rule of evolution. Bright coloration and complex song in male

remain an important means of relating throughout the life span.[2]

Smiling

Smiling is also quite clearly an evolved mechanism (Ambrose, 1960; Freedman, 1964). It is universally present in man and it has the same or similar interpersonal function everywhere, that of a positive greeting or of appeasement. Smiling is first seen in reflexive form in newborns, including prematures, when they are dozing with eyes closed, usually after a feeding. Even at these early ages, however, smiles can also be elicited by a voice or by rocking the infant and, since it occurs in infants whose gestational age is as low as seven months, there seems little doubt that smiling can also occur in utero. Visually elicited smiles occur somewhat later than sound elicited ones, though they are occasionally seen within the first week of life. These are called social smiles since they occur most readily when the eyes of infant and adult meet (see Loring, this volume). In the auditory mode the preference for a voice over other sounds also marks such smiles as "social" (Wolfe, 1963).

The major function of smiling, then, from a very early age is responsivity to another. As Bowlby pointed out, it provides an important means of attachment between adult and infant, and in later life it lends ease and promotes attachment in a wide variety of social encounters. It is also widely displayed between adults as a gesture of appeasement in that it is a major means of either

---

songbirds aid territoriality, non-specific dispersal, as well as mating, but marks the male's whereabouts and leaves him vulnerable to predation. Similarly, the fact that black-headed gulls remove the glistening eggshells soon after hatching probably serves to lower visibility of nest sites to predators, but while the parents are gone with the shells predators may attack the defenseless chicks (Tinbergen, 1965).

[2]This does not imply, as does psychoanalytic logic, that if a type of behavior occurs earlier in time it is necessarily causal to related behavior appearing later in time. Within evolutionary logic, for example, attachments between adults of a social species are as "primary" as are attachments between infant and adult.

overcoming or precluding dissension and angry feeling.

It is pure surmise, of course, as to whether the smiling response appeared phylogenetically as an adult-adult mechanism or as an adult-infant mechanism. It is most akin to the "frightened grin" in other primates, a gesture which occurs quite frequently by a subordinate animal when passing close to a dominant one (Hall & DeVore, 1965). Human smiling may well have originated with such a gesture in an evolutionary "turning to the opposite."

Regarding individual differences in smiling, some newborns never, or rarely, exhibit so-called reflexive smiling while others may become the pets of the nursery because of their constant display. From a 5-year longitudinal study, we have found consistency in the use of smiling as a social technique dating back to the reflexive eyes-closed smiles, e.g., a frequent eyes-closed smiler in the first months tends to be a frequent social smiler at five years.

The importance of the auditory and visual receptors in the young human infant seems directly related to its general motoric immaturity. Thus the eyes begin to search for form and movement in the environment soon after birth (Fantz, 1963; Greenman, 1963), and by two weeks of age over 50% of all infants will follow a moving person (Bayley, 1961).

At about two months the infant's searching for the adult face can be very impressive. If held at the shoulder an infant may hold its unsteady head back to get a view of the holder's face, craning its neck like an inquisitive goose. One is left with the ineluctable feeling that searching out the en face position is itself an evolved mechanism. Supporting this contention are the large numbers of experimental studies which find the face a preferred stimulus for most infants, including newborns and the fact that the adult feels "looked-at" for the first time just preceding the onset of social smiling (Loring, this volume).

The human orientation towards the face of another is undoubtedly bound up

with many aspects of evolutionary adaptation, including the upright stance, relative hairlessness, and rich musculature of the face; thus, there are the myriads of obvious and subtle non-verbal communications in which hominids engage. The culture-boundness vs. culture-independence of many of these expressions are under current investigation (Eibl-Eibesfeldt, 1965).

Cooing, Laughter, and Play

A few weeks after en face smiling starts, the infant begins to coo at the beholding adult who in turn feels the irresistible urge to respond, and as a result much time may be spent in such happy "conversation." Feedings and sleep have by then decreased and normally more and more time is spent in direct social interactions.

A somewhat more robust order of interaction is initiated by laughter, usually at four months, when the baby and caretaker begin to engage in mutual play. The joy the adult feels in this engagement is probably no less an evolved mechanism than is the laughter of the baby, and doubtless such mutually reinforcing emotion ends up as attachment.

The factor of time spent together is also a solidifier of attachment (St. Exupery, 1943) and this is served, of course, by all the above mechanisms.

Fear of Strangers

As the infant becomes embedded in the lives of those about him, another common phenomenon emerges, the fear of strangers. As early as three months of age in some infants, a definite preference for a parent or caretaker may be seen. This may be manifested at first by preferential smiling and cooing and following with the eyes. The infant may then cry when confronted by a stranger, especially if the place is also novel, as in a doctor's office.

The possible phylogenetic origins of this response have been discussed

by Freedman (1961, 1965) where it is pointed out that many mammals and birds show similar fear responses to strangers and strange places after they have formed their initial attachments. In carnivores the fear response starts as they begin to travel farther and farther from the nest (about five weeks of age in dogs). In preyed-upon herd animals the young are on their feet within minutes after birth, attachment is quickly formed to the mother, and the fear response can be seen soon thereafter. Closely related is the advent of fear of heights which follows soon after the beginnings of motility in animals and humans, and without prior experience of falling (Gibson & Walk, 1960). With motility, all animals become exposed to many new dangers as their investigative drives take them from the nest, and self-protective counter drives are necessary to assure survival.

While motility and fear of strangers are related mechanisms in lower mammals, when a human infant develops its fear of strangers, usually between six and nine months, it simply does not have the motor ability to escape a predator. It therefore seems a reasonable hypothesis that in human infants the fear of strangers serves mainly to prevent dilution of primary relationships and, in addition, serves to intensify the bonds between the infant and those already close to him.[1] In this regard the experimental work of Kovach and Hess (1963) with chicks indicates the reaction of fright makes primary bonds even stronger, so that this function is already served in lower forms.

To summarize, social attachment is an adaptive, evolved characteristic of hominids and the formation of human mutuality is attained via many evolved

---

[1]There have been a number of alternative explanations of the fear of strangers, and Mieli (1957) has postulated that the fear is caused by an inability to assimilate the perceptual input. One trouble with such cognitive interpretations, however, is that they never ask the prior question: Why this particular response and not another?

Spitz (1950) has made a cognitive-psychoanalytic interpretation by attributing the fear reaction to the infant's insight that other people are "not

mechanisms which are mutually reinforcing and which assure social interactions. Some examples are the desire for physical proximity, the appearance of mutual watching, mutual smiling, mutual cooing, mutual laughter and play; protection of the young when they cry or become fearful may also be viewed as means by which attachment is increased as may the very act of time spent together. By the time imitation[1] and the first use of words start,[2] late in the first year, social bonds are normally very strong and the child is an integral part of the lives of those about him.

What is the relationship between style of attachment and personality? Let us go back to Bowlby's (1958) statement that there is agreement ". . . in recognizing the child's first object relations as the foundation stone of his personality." We are in a position now to question the implicit logic of this statement, i.e., that early attachments "cause" personality. The point is that early attachments <u>are</u> personality and that we are persons, or personalities, from the very start. To speak of these early attachments as causing personality is to commit the logical fallacy of the <u>tabula rasa</u> mind, i.e., where there was nothing, something eventually appears. While it is true one is always becoming, one is also always <u>being</u>, and the style in which these early interactions occur is itself personality. Each infant negotiates these behaviors in a unique way, that

---

mother," so that the fear reaction for Spitz is a sort of anticipatory separation anxiety. A simple experiment by Jacobson (1966) has served to eliminate this overly-sophisticated interpretation, for she found that babies are simply more fearful of an adult stranger than of a child stranger who is dressed the same and rehearsed to behave just like the adult. There seems little doubt that it is the stranger qua stranger that is feared, and that size adds to the fright.

[1]Imitation is clearly a magnificent means for the acquisition of all forms of behavior and it becomes an effective force towards the end of the first year. As in sucking, craning the neck to see the face, reaching, turning over, sitting and standing, the drive to emulate is extremely strong. Only in the human is it carried to such persistent extremes, and it is a comment on psychoanalytic theory that it should be concerned with "anal" play in the second year while imitation, which is flowering, has been largely undiscussed. What better way to work into eventual autonomy than to practice directly an experienced partner's methods of coping with the world?

[2]The evolutionary aspect of language acquisition is receiving much current attention. See Rebelsky et al., this volume.

is, in his very own variation on the basic species theme.

Regarding this latter point, as we have seen, the process of forming attachments involves the constant actualization[1] of phylogenetically derived capacities, and a theoretical model which neglects this fact is bound to develop illogicalities to account for the appearance of these behaviors. As acknowledged by Bowlby, the tendency has been to consider infantile experience the source of later behavior, and as a consequence there has been a considerable increase in interest and in actual work with infants in the hope of getting at causes. If the author reads these trends correctly, the next step will involve attributing the origins of infant behavior to uterine life, and then to the genome and D.N.A. In point of fact this is a regression to "homunculus" theory; since selection can and did occur in terms of developments at all ontogenetic points, the entire life span is a product of evolutionary adaptation and a psychologist interested in causes of behavior must simultaneously consider phylogeny and ontogeny, difficult as it may seem.

While this has been a far from complete analysis of how attachments and personality form, our main purpose was to illustrate the logic of the evolutionary approach and the fact that hypotheses derived from evolutionary thinking are open to experimental work. In terms of its scope, power, and intellectual appeal evolutionary theory has no equal and is simply waiting for interested psychologists to put it to work. In the words of Herman Muller (1959), "One hundred years without Darwinism are enough."

---

[1] By actualization we have in mind Goldstein's (1939) meaning: There is only one drive which is invariant and characteristic of all living organisms, the drive to actualize their inborn capacities. All other so-called drives are variable and subsidiary to this one.

BIBLIOGRAPHY

Ainsworth, M.D. The effects of maternal deprivation: A review of findings and controversy in the content of research strategy. Public Health Papers, 1962, 14. Geneva: W.H.O.

Allport, G. Personality: a Psychological Interpretation. New York: Holt, 1937.

Ambrose, J.A. The smiling and related responses in early human infancy: an experimental and theoretical study of their course and significance. Ph.D. dissertation, University of London, 1960.

Appell, G., and Aubry, J. Maternal deprivation in young children. Film: 16 mm; 22 min; sound. Distributors: New York University Film Library; Tavistock Child Development Research Unit, London; United Nations, Geneva, 1951.

Ausubel, D.P. Theory and Problems of Child Development. New York: Grune and Stratton, Inc., 1958.

Bandura,A., and Walters, R.H. Aggression. In H.W. Stevenson, J. Kagan, and C. Spiker (Eds.), Child Psychology. Chicago: The University of Chicago Press, 1963.

Bateson, G., and Mead, M. Karba's First Years. Sound film. New York University Film Library, 1942.

Bayley, N. Consistency of maternal and child behaviors in the Berkeley growth study. Vita Humana, 1964, 7, 73-95.

Bayley, N. Personal Communication, 1961.

Beach, F.A. Evolutionary aspects of psychoendocrinology. In A. Roe and G.G. Simpson, Behaviour and Evolution. New Haven: Yale University Press, 1958.

Benjamin, J.D. Prediction and psychopathologic theory. In L. Jessner and E. Pavenstadt (Eds.), Dynamic Psychopathology in Childhood. New York: Grune and Stratton, 1959.

Bowlby, J. Maternal Care and Mental Health. Geneva: World Health Organization: Monograph Series No. 2, 1952.

Bowlby, J. The nature of the child's tie to his mother. Int. J. Psychoanal., 1958, 30, 350-373.

Bowlby, J. Symposium on psychoanalysis and the development of object relations. Int. J. Psycho-Anal., 1960, 41, 313.

Casler, L. Maternal deprivation: a critical review of the literature. Monog. Soc. Res. Child Develop., 1961, 26, 2.

Cassirer, E. An Essay on Man. New York: Yale University Press, 1944.
de Chardin, T. The Phenomenon of Man, Harper, 1961, p. 172-
Diamond, M. A critical evaluation of the ontogeny of human sexual behavior. Quart. Rev. Biol., 1965, 40, 2.

Dobzhansky, T. Heredity and the Nature of Man. New York: Harcourt, Brace and World, Inc., 1964.

Eibl-Eibesfeldt, I. Personal communication. 1965.

Erikson, E.H. Childhood and Society. New York: W.W. Norton and Co., Inc., 1950.

Escalona, S., and Heider, G.M. Prediction and Outcome. New York: Basic Books, 1959.

Etkin, W. Types of social organization in birds and mammals. In W. Etkin (Ed.), Social Behavior and Organization Among Vertebrates. Chicago: The University of Chicago Press, 1964.

Fenichel, O. Psychoanalytic Theory of Neuroses. New York: W. W. Norton and Co., Inc., 1945.

Freedman, D.G. Constitutional and environmental interactions in rearing of four breeds of dogs. Science, 1958, 127, 585-586.

Freedman, D.G. The infant's fear of strangers and the flight response. J. Child Psychol. Psychiat., 1961, 242-248.

Freedman, D.G. An ethological approach to the genetical study of human behaviour. In S. Vandenberg (Ed.), Methods and Goals in Human Behavior Genetics. New York: Academic Press, Inc., 1965.

Freedman, D.G. In preparation. (1966)

Freedman, D.G., King, J.A., and Elliot, O. Critical period in the social development of dogs. Science, 133, 1016-1017, 1961.

Freud, A. The concept of developmental lines. In Psychoanalytic Study of the Child. New York: International Universities Press, 1963, 18, 245-265.

Freud, S. Three contributions to the theory of sex. Nerv. Ment. Dis. Monogr., 1918, 7.

Fries, M., and Woolf, D. Some hypotheses on the role of the congenital activity type in development. Psychoanal. Stud. Child, 1953, 8, 48.

Geber, M. Problèmes posé par le développement du jeune enfant Africain en fonction de son milieu social. Le Travail Humain., 1956, 6, 17-29.

Gibson, E.R., and Walk, R.D. The visual cliff. Sci. American, 1960, 202.

Ginsburg, B.E. Genetic parameters in behavior research. To be published in J. Hirsch (Ed.), Genetics and Behavior. New York: McGraw-Hill, 1966.

Ginsburg, B.E., and Laughlin, W.S. The multiple bases of human adaptability and achievement: a species point of view. Eugen. Quart., Sept. 1966. In press.

Goldfarb, W. Emotional and intellectual consequences of psychologic deprivation in infancy: a reevaluation. In P. Hoch and J. Zubin (Eds.), Psychopathology of Childhood. New York: Grune and Stratton, 1955.

Goldstein, K. The Organism. New York: American Book Company, 1939.

Gorer, G. Theoretical approach: 1941. In M. Mead and M. Wolfenstein (Eds.), Childhood in Contemporary Cultures. Chicago: The University of Chicago Press, 1955.

Gray, P.H. Theory and evidence of imprinting in human infants. J. Psychol., 1958, 46, 155-166.

Greenman, G.W. Visual behavior of newborn infants. In A.J. Solnit and S.A. Provence, Modern Perspectives in Child Development. New York: International Universities Press, Inc., 1963.

Hall, K.R.L, and DeVore, I. Baboon social behavior. In I. DeVore (Ed.), Primate Behavior. New York: Holt, Rinehart & Winston, 1965.

Haring, D.G. Comment on Japanese personal character: pre-war. In D. G. Haring (Ed.), Personal Character and Cultural Milieu. New York: Syracuse University Press, 1956.

Harlow, H.F., and Zimmermann, R.R. Affectional responses in the infant monkey. Science, 1959, 130, 421-432.

Harrison, G.A. Human genetics. In Human Biology - an introduction to human evolution, variation and growth. New York: Oxford University Press, 1964.

Hartmann, H. Psychoanalysis and developmental psychology. Psychoanal. Stud. Child, 1950, 5-12.

Hebb, D.O. Heredity and environment in mammalian behavior. Brit. J. Animal Behav., 1953, 1, 2, 43-47.

Marshall, D. Personal communication. Honolulu, 1965.

Mason, W.A. The effects of social restriction on the behavior of Rhesus monkeys: I. Free social behavior. In T.E. McGill (Ed.), Readings in Animal Behavior. New York: Holt, Rinehart and Winston, 1965.

Mayr, E. Behavior and Systematics. In A. Roe and G.G. Simpson (Eds.), Behavior and Evolution: New Haven: Yale University Press, 1958.

Mead, M. Male and Female. New York: William Morrow and Co., 1949.

Mead, M. Theoretical setting. In M. Mead and M. Wolfenstein (Eds.), Childhood in Contemporary Cultures. Chicago: The University of Chicago Press, 1955.

Meili, R. Anfänge der charakterentwicklung. Bern: Verlag Hans Huber, 1957.

Money, J. Psychosexual differentiation. In J. Money (Ed.), Sex Research: New Developments. New York: Holt, Rinehart and Winston, 1965.

Muller, H.J. One hundred years without Darwinism are enough. Sch. Sci. Math., 1959, 59, 304-316.

Murphy, G. Personality. New York: Harper and Brothers, 1947.

Murphy, L.B. Factors in continuity and change in the development of adaptational style in children. Vita Humana, 1964, 7, 96-114.

Mussen, P.H., Conger, J.J., and Kagan, J. Child Development and Personality, 2d ed. New York: Harper and Row, 1963.

Neilon, P. Shirley's babies after fifteen years. J. Genet. Psychol., 1948, 73, 175-186.

Newman, H.H., Freeman, F.N., and Holzinger, K.J. Twins: a Study of Heredity and Environment. Chicago: University of Chicago Press, 1937.

Nichols, R. Unpublished paper, 2d. Conf. on Hum. Behavior Genetics, Louisville, 1966.

Orlansky, H. Infant care and personality. Psychol. Bull., 1949, 46, 1-48.

Pepper, S.C. World Hypotheses. Berkeley: University of California Press, 1961.

Piaget, J. Origins of Intelligence in Children. New York: International Universities Press, 1952.

Honzik, M.P. Personality consistency and change: Some comments on papers by Bayley, Macfarlane, Moss, Kagan, & Murphy. Vita Humana, 1964, 7, 67-72.

Jacobson, Joan. Unpublished data. University of Chicago, 1966.

Kagan, J., and Moss, H.A. Stability of passive and dependent behavior from childhood through adulthood. Child Develpm., 1960, 31, 577-591.

Kagan, J., and Moss, H.A. Birth to Maturity: A Study in Psychological Development. New York: Wiley, 1962.

Klein, Melanie. Envy and Gratitude, A Study of Unconscious Sources. New York: Basic Books, 1957.

Kovach, J.K., and Hess, E.H. Imprinting: effects of painful stimulation upon the following response. J. comp. physiol. Psychol., 1963, 56, 461-464.

Landau, R.L. University of Chicago. Work in progress.

Leonard, M.R. Problems in identification and ego development in twins. In Psychoanalytic Study of the Child, 1961, 16, 300-318.

Lesser, G.S., Fifer, G., and Clark, D.H. Mental abilities of children from different social-class and cultural groups. Monogr. Soc. Res. Child Develpm., 1965, 102, 30, 4.

Loehlin, J.C. A hereditary-environment analysis of personality inventory data. In S.G. Vandenberg (Ed.), Methods and Goals in Human Behavior Genetics. New York: Academic Press, 1965.

Lorenz, K. Companionship in bird life. In C.H. Schiller (Ed.), Instinctive Behaviour. London: Methuen, 1957.

Lorenz, K. On Aggression. New York: Harcourt, Brace & World, 1966.

Macfarlane, J.W. Perspectives on personality consistency and change from the guidance study. Vita Humana, 1964, 7, 115-126.

MacKinnon, D.W. The structure of personality. In J. McV. Hunt (Ed.), Personality and the Behavior Disorders, Vol. 1. New York: The Ronald Press Co., 1944.

MacKinnon, D.W. (Ed.). Selection of Personnel for the Office of Strategic Services: Assessment of Men. New York: Rinehart, 1948.

Malinowski, B., and Briffault, R. Marriage: Past and Present. Boston: Porter Sargent, 1956.

Pinneau, S.R. The infantile disorders of hospitalism and anaclitic depression. Psychol. Bull., 1955, 52, 429.

Riesen, A.H. Stimulation as a requirement for growth and function in behavioral development. In Functions of Varied Experience. Homewood: The Dorsey Press, Inc., 1961.

Saint Exupery, A. de. The Little Prince. New York: Harcourt Brace, 1943.

Schur, M. Discussion of Dr. John Bowlby's paper. In Psychoanalytic Study of the Child. New York: International Universities Press, 1960, 15, 63.

Scott, J.P. Critical periods in behavioral development. Science, 138, 949-958, 1962.

Schaeffer, E.S. and Bayley, N. Maternal Behavior, Child Behavior, and their Intercorrelations From Infancy Through Adolescence. Monog. SRCD, 1963, 28:

Scrimshaw, N.S., and Behar, M. Protein malnutrition in young children. Science, 1961, 133, 2039-2047.

Sheldon, W.H., and Stevens, S.S. The Varieties of Temperament. New York: Harper's, 1942.

Simpson, G.G. The Meaning of Evolution. New Haven: Yale University Press, 1964.

Spitz, R.A. Hospitalism. In Psychoanalytic Study of the Child. New York: International Universities Press, 1945, 1, 53.

Spitz, R.A. Hospitalism: a follow-up report. In Psychoanalytic Study of the Child. New York: International Universities Press, 1946, 2, 113.

Spitz, R.A. Discussion of Dr. Bowlby's paper. In Psychoanalytic Study of the Child. New York: International Universities Press, 1960, 15, 85.

Spitz, R.A. The First Year of Life. New York: International Universities Press, Inc., 1965.

Stern, K. Principles of Human Genetics, 2d ed. San Francisco: W.H. Freeman and Co., 1960.

Stockard, C.R. The Physical Basis of Personality. New York: W.W. Norton and Co., 1931.

Sullivan, H.S. Collected Works. New York: W. W. Norton and Co., 1965.

Thomas, A., Chess, S., Birch, H.G., Hertzig, M.E., Korn, S. Behavioral Individuality in Early Childhood. New York: New York University Press, 1963.

Tinbergen, N. The shell menace. In T.E. McGill (Ed.), Readings in Animal Behavior. New York: Holt, Rinehart and Winston, 1965.

Waddington, C.H. The Ethical Animal. New York: Atheneum, 1960.

Waddington, C.H. The Nature of Life. New York: Harper Torch book, 1966.

Walters, R.H., and Parke, R.D. The role of the distance receptors in the development of social responsiveness. In L.P. Lipsitt and C.C. Spiker (Eds.), Advances in Child Development and Behavior. New York: Academic Press, 1965. (Vol. 2.)

White, L.A. Energy and the evolution of culture. In The Science of Culture, 1949, 363-393.

Willier, B.H., Weiss, P.A., Hamburger, V. (Eds.). Analysis of Development. Philadelphia: W.B. Saunders Company, 1955.

Wolff, P.H. Observations on the early development of smiling. In B.M. Foss (Ed.), Determinants of Infant Behavior.II. London: Methuen and Co., Ltd., 1963.

Wolff, P.H. Natural history of crying. To be published in B.M. Foss (Ed.), Determinants of Infant Behavior. IV. London: Methuen and Co., Ltd., 1967.

Von Uexküll, J. A stroll through the world of animals and men. In C.H. Schiller (Ed.), Instinctive Behavior. New York: International Universities Press, Inc., 1957.

Yarrow, L.J. Maternal deprivation: toward an empirical and conceptual reevaluation. Psychol. Bull., 1961, 58, 6, 459-490.

Young, W.C. The organization of sexual behavior by hormonal action during the prenatal and larval periods in vertebrates. In F. Beach (Ed.), Sex Behavior. New York: Wiley, 1965.

Young, W.C., Goy, R.W., and Phoenix, C.H. Hormones and sexual behavior. In J. Money (Ed.), Sex Research: New Developments. New York: Holt, Rinehart and Winston, 1965.